

REMARKS/ARGUMENTS

Original Claim 1 has been rewritten as newly added claim 22 in which the claim now indicates that the copolymer is prepared by the method disclosed in Claim 11. Original claims 2 to 10 and 19 to 21 have also been rewritten as newly added claims 23 to 34 which depend upon newly added claim 22.

The Examiner has rejected Claims 1 to 10 and 19 to 21 under 35 U.S.C. § 103(a) as being unpatentable over Dillman et al, U.S. Patent No. 5,420,203 (hereinafter "Dillman et al"). This rejection is respectfully traversed with regard to newly added claims 22 to 34.

Dillman et al fails to teach or suggest a radial styrenic block copolymer of the formula $(AB)_nX$ in which the weight percentage of the polymer wherein $n=5+$ is less than about 8 percent as prepared by the process claimed by Applicants. Column 1, lines 66 to 67, of Dillman et al indicates that the goal of Dillman et al is to produce **high diblock content** block copolymer end use compositions. In column 5, lines 53 to 56, Dillman et al make a generalized statement in which they note that "it is preferred for adhesives, coating, and sealant uses that the level of diblock in the end use composition range from 10% to 75% by weight of the total amount of the block copolymer present." They further state that for impact modification compositions the preferred amount of diblock is from 25 to 100%.

As noted on page 4 of the present application, the objective of the present invention is "...to provide a method for producing block copolymers having increased three and four arm contents and reduced five and higher arm contents." Accordingly, Applicants are not seeking high diblock content. Applicants are able to increase three and four arm contents and reduce five and higher arm contents by the addition of a metal alkyl compound (in the examples of the present application, TEA was used).

Furthermore, as can be seen in Table 1 of the present application, when copolymers were prepared using the method of the present invention (one in which TEA was employed), Applicants were able to obtain a significant decrease in the weight percentage of polymers where the value of n was $5+$ compared to Comparative Example 6 (a copolymer prepared without the addition of TEA). More than a two fold decrease in the percentage is noted. Comparative Example 6 gave a percentage of 12.1 while the

copolymers of the present invention gave 5.3 (Example 1), 2.6 (Example 2), 4.6 (Example 3), 3.8 (Example 4) and 3.4 (Example 5). The amount of three arm and four arm polymers was significantly higher than the amount of copolymers where $n=1$, $n=2$ or $n=5+$.

Absent some teaching or suggestion that copolymers in which the weight percentage of the polymer where n is at least 5 is less than about 8 percent can be produced by modifying the process of Dillman et al to that claimed by Applicants, it cannot be said that Claims 22 to 34 are obvious in view of Dillman et al. Accordingly, Applicants request that the 35 U.S.C. § 103(a) rejection be withdrawn and that Claims 22 to 34 be allowed.

The Examiner has rejected Claims 11 to 18 under 35 U.S.C. § 103(a) as being unpatentable over Shade et al, U.S. Patent No. 6,506,846 (hereinafter "Shade et al"). This rejection is respectfully traversed.

The Examiner notes that the difference between the present Claim 11 and Schade et al is the requirement in the present claim that a mixture of styrene and diene monomers is polymerizing in the first step.

In the process of Schade et al, in the first step, a diene is mixed with a polyfunctional alkali metal organyl compound and allowed to polymerize. Polymerization is then terminated by the addition of alcohol (see examples) to obtain a rubber block. Note that polyfunctional coupling agents may also be used to link the rubber blocks. In the second step, the rubber block functions as a solvent and is mixed with styrene and a metal alkyl compound to polymerize the styrene. More specifically, Schade et al note in column 4, lines 28 to 35, that "[s]urprisingly, it has been found that the polymerization of the hard matrix can be carried out without further addition of anionic polymerization initiator if use is made of a rubber solution which, as described above, has been prepared by anionic polymerization and terminated by chain termination or coupling. In this case, the metal alkyl compounds, which otherwise can have a retarding effect, can initiate the polymerization of the hard matrix." Schade et al further indicate in column 4, lines 38 to 40, that "[t]he anionic polymerization of the hard matrix in the second reaction zone is preferably initiated exclusively by the addition of a magnesium dialkyl compound." Optionally, sec butyl lithium may be added to further

promote polymerization in the second step. At this point, without the use of a coupling agent, Schade does not have a block copolymer. Schade et al instead has a mixture of rubber blocks and styrene blocks. Even when using coupling agent, what Schade et al obtain is different from the present invention.


In the process of the present invention, styrene is polymerized with sec butyl lithium to create a living homopolymer. Butadiene is then added and either during or after polymerization TEA is added. Once this reaction has gone to completion, a coupling agent is added. This process and polymer differ from that of Schade et al in that Applicants obtain an elastomeric radial copolymer while Schade et al will have a mixture of different types of block copolymers in styrene (HIPS – high impact polystyrene).

Applicants maintain that in view of the above arguments, Claims 11 to 18, are patentable over Schade et al and respectfully request withdrawal of the §103(a) rejection and allowance of said claims.

Although Applicant believes that no additional fees are due in connection with this response, the Commissioner is hereby authorized to charge counsel's Deposit Account No. 50-1951/W-0006, for any fees, including extension of time fees or excess claim fees, required to make this response timely and acceptable to the Office.

In view of the above amendments and arguments, Applicants respectfully maintain that the claims are now in condition for allowance. Reconsideration and withdrawal of the rejections to the claims are requested. Allowance of the claims is earnestly solicited.

Respectfully submitted,

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